Unit 1

Short answers

1. Define Operating System with example
2. Explain two views of the operating system
3. What are the goals of the OS
4. Write Advantages and Disadvantages of OS
5. Define kernel and its functionality
6. Define Linux and its basic features
7. What are the advantages of Linux
8. Define Multitasking operating system
9. Explain Real time OS
10. Write about simple and layered structure
11. Write a few Network commands
12. Write a few process utilities
13. Explain about the components of modern computer system and Operating System

Long Answers

1. Explain Functions of OS
2. Explain Different types of OS.
3. List out the different services provided by the operating system and explain in detail
4. Determine various Utilities present in linux
5. Define File. Briefly Explain in detail about the LINUX file system
6. Explain Linux system architecture with a neat diagram
7. Explain different operations performed by the operating system

Unit -2

Short Answers

1. Define Process and Process state
2. Define Process Control Block
3. Define Threads and write types of threads
4. What are Multi Threading models?
5. What is the difference between user level and kernel level thread?
6. What is Process Scheduling?
7. Define context switch
8. What are scheduling criteria?
9. Define preemption and non preemption
10. What is the Convoy Effect?
11. What are the reasons for need of cooperating processes?

Long Answers

1. What is a Process? Explain the term PCB in detail?
2. Explain the process state transition diagram?
3. A. Write difference between Process and Program?

B. Write difference between Process and Thread?

4. Explain types of Multi Threading Models with neat diagrams?
5. Explain Types of Threads (User and Kernel)
6. What are process schedulers ? Explain different types of process schedulers. (long term, short term, medium term)
7. Scheduling Algorithms:
    a. For the processes listed below, evaluate Average Waiting Time and Average Turnaround Time i) Preemptive Priority ii) RR(Q=2).

Processes	A.T	B.T	Priority
A	0.0000	5	4
B	2.0001	4	2
C	2.0001	2	6
D	4.0001	4	3

Draw the Gantt chart and calculate the turnaround time and waiting time of the jobs for FCFS (First Come First Served), SJF (Shortest Job First), SRTF (Shortest Remaining Time First) and RR (Round Robin with time quantum 10) scheduling algorithms.

    b. Consider the following set of processes assumed to have arrived at time 0, in the order P1,P2,P3,P4,P5 with the length of the CPU burst given in milliseconds. Using a priority scheduling algorithm find average waiting time and turn around time.

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	4
P4	1	5
P5	2	5

    c. Consider the set of 4 processes whose arrival time and the burst time are given below. If the CPU scheduling policy is the shortest remaining time first ,calculate the average waiting time and turn around time.

PROCESS	ARRIVAL TIME	BURST TIME
P1	0	8
P2	1	4
P3	2	9
P4	3	5

d. Five batch jobs A, B, C, D and E arrive at a computer centre at almost the same time. They have estimated running times of 10,6,2,4 and 8 minutes. Their priorities are 3,5,2,1 and 4 respectively, with 5 being the highest priority. For each of the following scheduling algorithms determine the turnaround time of each process and waiting time of each process. Ignore process switching overhead. Mention which algorithm results in minimal average waiting time.
    1. Round Robin
    2. Priority scheduling
    3. First come first served
    4. Shortest job first.

   For case i) Assume that system is multiprocessing, and each job gets its fair share of the CPU. (time quantum 2 minutes0. For cases (ii), (iii) and (iv) assume that only one job runs at a time, until it finishes. All jobs are completely CPU bound.

8. Explain different types of shell in detail?
9. A. Make use of a shell script to find the factorial of a number.
   B. Develop a shell script to list all of the directory files in a directory.
   C.what are shell responsibilities? Briefly explain about different types of shells in Linux.

Unit - 3

Short answers:

1. What are is reason allocation graph
2. Define Deadlock
3. What are the necessary conditions for Deadlock (Deadlock Characterization)
4. Define Wait for graph
5. What is system model
6. What are the methods of handling Deadlock
7. What is Safe sequence
8. Define Semaphores
9. Define Critical Section
10. Conditions for Critical Section
11. Define Monitor

Long Answers:

1. How Banker's algorithm helps to avoid deadlock
2. Define the terms and explain about Deadlock avoidance, Deadlock prevention, Deadlock detection and Deadlock Recovery.
3. Problems on Banker's Algorithm:
    a. Consider the following snapshot of a system:

Allocation	Max	Available
A B C D	A B C D	A B C D

P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Apply Banker's Algorithm and determine whether the system is in safe state or not?

b. Consider the table given below for a system, find the need matrix and the safety sequence, using Banker's algorithm.

Resource – 3 types
A – (10 instances)
B – (5 instances)
C – (7 instances)

Process	Allocation	Maximum	Available
	A B C	A B C	A B C
p0	0 1 0	7 5 3	3 3 2
p1	2 0 0	3 2 2	
p2	3 0 2	9 0 2	
p3	2 1 1	2 2 2	
p4	0 0 2	4 3 3	

4. Explain Peterson's solution for critical section problem
5. Explain briefly classical problems of synchronisation and how semaphores addresses it
6. Dining Philosophers problem addressed by monitors and Semaphores
7. Differences between Semaphores and Monitors
8. A system has 3 devices D1, D2 and D3 and 3 processes P1, P2, and P3. P1 is holding D1 and waiting for D3. P2 is holding D2 and waiting for D1. P3 is holding D3 and waiting for D2. Draw resource allocation graph and wait-for graph. Is the system in a deadlock state or not? Explain.
9. Explain about Synchronisation Hardware.

Unit 4

Short Answers

1. Define Interprocess communication(IPC)?
2. Define Pipes and what are its types?
3. Define sockets?
4. Define the Cooperating process?
5. List reasons for process cooperating required?
6. Define Paging ?
7. Define segmentation?
8. Define logical address and physical address?
9. What are the Page replacement algorithms?
10. Define Swapping?
11. What is Demand paging?

12. What is Page fault?
13. What is Belady Anomaly?
14. Define Thrashing?

Long Answers

1. Explain Message Passing.
2. Explain Shared Memory.
3. Define System calls and explain different system calls in the OS.
4. Explain about Page Replacement Algorithms.
5. Write about Page Faults and its handling
6. Explain Segmentation with paging MULTICS.
7. Explain Page tables and its types.
8. Page Replacement Algorithms:.
    a. Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Determine how many page faults would occur for the Optimal page replacement algorithm. Assume three frames are initially empty.
    b. Discuss in detail about the least recently used page replacement algorithm with example.Consider the following page reference string 2, 3, 4, 5, 3, 2, 6, 7, 3, 2, 3, 4, 1, 7, 1, 4, 3, 2, 3, 4, 7. Calculate the number of page faults with LRU, FIFO and optimal page replacement algorithms with frame size of 3.
    c. Discuss the procedure for page fault in demand paging. consider the following reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. Assume there are three frames. Apply all replacement algorithms to the reference string above and find out how many page fonts are produced.And also find Hit and Miss Ratio.
    d. Given page reference string: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm
9. Differentiate between paging and segmentation,
10. Consider a swapping system in which memory consists of the following hole sizes in memory order: 12 KB, 4 KB, 24 KB, 15 KB, 9 KB, 7 KB, 10 KB, and 11 KB. Which hole is taken for successive segment requests of : (i) 14 KB (ii) 8 KB (iii) 5 KB for first fit, best fit, worst fit, and next fit approaches
11. Explain about Internal Fragmentation and External Fragmentation.
12. What are the disadvantages of contiguous memory allocation? How to prevent them.
13. What is virtual memory? Explain: Suppose we have a demand paged memory. The page table is held in registers. It takes 8ms to service a page fault if an empty page is available or the replaced page is not modified, and 20ms if the replaced page is modified. Memory access time is 100ns. Assume that the page to be replaced is modified 70% of the time. What is the maximum acceptable page fault rate for an effective access time of no more than 200ns?

Unit-5

Short Answers

1. Define File and its types.
2. Define File operations.
3. Define Virtual File System(VFS).
4. Define Criteria for Disk Scheduling.
5. Define File Attributes and write its operation.
6. What are types of system calls?
7. What are different types of implementation of directory?

Long answers

1. Explain File allocation methods with neat diagrams.
2. Explain File access methods with neat diagrams.
3. Explain Directory organisation with neat diagrams.
4. Problems on Disk Scheduling Algorithms.
    a. Suppose the head of a moving head disk with 200 tracks, numbered 0 to 199, is currently serving a request at track 143 and has just finished a request at track 125.If the queue of requests is kept in FIFO order: 86, 147, 91, 177, 94, 150, 102, 175,130. What is the total head movement to satisfy these requests for the following disk scheduling algorithms? (a) FCFS(b) SCAN (c) SSTF (d) C- SCAN
    b. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The current head position is at cylinder 143. The queue of pending requests is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following Disk scheduling algorithms? a) SSTF b) SCAN
5. Classify different types of files and list their extensions.
6. What are raid models(not there in syllabus given some times)